IN THE CLAIMS

1. (currently amended) A radio communication device comprising:
   a. N plurality of antennas;
   b. a baseband signal processor that generates transmit signals and that recovers data from receive signals; and
   c. a radio transceiver coupled to the baseband signal processor that upconverts the transmit signals for transmission via N plurality of antennas and downconverts signals received by the N plurality of antennas to produce receive signals;
   d. wherein the baseband signal processor ~~of~~ applies a transmit antenna vector to weight a baseband signal to be transmitted simultaneously from each of N plurality of antennas, the transmit antenna weight vector comprising a complex transmit antenna weight for each of the N plurality of antennas, wherein each complex transmit antenna weight has a magnitude and a phase whose values may vary with frequency across a bandwidth of the baseband signal, thereby generating N transmit signals each of which is weighted across the bandwidth of the baseband signal such that at substantially all frequencies of the baseband signal, the sum of the power of the transmit signals across the N plurality of antennas ~~of the first communication device~~ is equal to a constant.
2. (currently amended) The device of claim 1, wherein the baseband signal processor further determines a receive weight vector from signals received from another communication device by the N plurality of antennas, and updates the transmit weight vector for the N plurality of antennas for transmitting signals to the ~~second~~ <u>other</u> communication device by computing a conjugate of the receive weight vector divided by a norm of the conjugate of the receive weight vector, using the updated transmit weight vector when next transmitting to the other communication device.
3. (original) The device of claim 2, wherein the baseband signal processor updates the transmit weight vector each time a signal is received from the other communication device and over time converging to a transmit weight vector that

optimize a signal-to-noise ratio for communication with the other communication devices.

4. (original) The device of claim 3, wherein the baseband signal processor stores optimum transmit antenna weights indexed against an identifier for the other communication device.
5. (currently amended) The device of claim 1, wherein the baseband signal processor generates the transmit ~~eight~~ weight vector for each of K frequency sub-bands or sub-carriers of the baseband signal that correspond to sub-carriers of a multi-carrier baseband signal or to synthesized frequency sub-bands of a single carrier baseband signal.
6. (original) The device of claim 5, wherein the baseband signal processor stores, for each of the N antennas, complex transmit antenna weights for a subset of the K frequency sub-bands or sub-carriers.
7. (original) The device of claim 6, wherein the baseband signal processor retrieves the stored subset of complex transmit antenna weights and generates therefrom the complete set of antenna weights for all of the K frequency sub-bands or sub-carriers using interpolation techniques.
8. (original) A wireless local area network access point device comprising the device of claim 1.
9. (original) A radio communication system of claim 1, and further comprising a second radio communication device that comprises:
   a. at least one antenna;
   b. a baseband signal processor that generates a transmit signal and that recovers data from receive signals; and
   c. a radio transceiver coupled to the baseband signal processor that upconverts the transmit signal for transmission via the antenna and that downconverts a signal received by the antenna.
10. (currently amended) The system of claim 9, wherein the second communication device comprises M plurality of antennas, and wherein the baseband signal processor determines a receive weight vector comprising complex receive weights for each of the M plurality of antennas from the N transmit signals received by the

M plurality of antennas, wherein each receive antenna weight has a magnitude and phase whose values may vary with frequency across a bandwidth of a baseband signal derived from the N transmit signals received by the second communication device; computes a transmit weight vector comprising a plurality of complex transmit antenna weights for the M plurality of antennas by computing a conjugate of the receive weight vector divided by the norm of the receive weight vector; and applies the transmit weight vector to a baseband signal to be transmitted from the second communication device to the ~~first~~ <u>other</u> communication device, thereby generating M plurality of transmit signals such that at substantially all frequencies of the baseband signal, the sum of the power of the transmit signals across the M plurality of antennas is equal to a constant.

11. (original) A method for communicating signals from a first communication device to a second communication device using radio frequency (RF) communication techniques, comprising:
    a. applying a transmit antenna vector to a baseband signal to be transmitted from the first communication device to the second communication device, the transmit antenna weight vector comprising a complex transmit antenna weight for each of the N plurality of antennas, wherein each complex transmit antenna weight has a magnitude and a phase whose values may vary with frequency across a bandwidth of the baseband signal, thereby generating N transmit signals each of which is weighted across the bandwidth of the baseband signal such that at substantially all frequencies of the baseband signal, the sum of the power of the transmit signals across the N plurality of antennas of the first communication device is equal to a constant; and
    b. transmitting the N plurality of transmit signals from the N plurality of antennas to the second communication device.
12. (original) The method of claim 11, and further comprising the steps of receiving at the N plurality of antennas of the first communication device one or more signals transmitted by the second communication device; determining a receive weight vector from the one or more signals received from the second communication device by the N plurality of antennas; and updating the transmit

weight vector for the N plurality of antennas of the first communication device for transmitting signals to the second communication device by computing a conjugate of the receive weight vector of the first communication device divided by a norm of the conjugate of the receive weight vector.

13. (original) The method of claim 11, and further comprising repeating the step of updating each time one or more signals are received from the second communication device and over time converging to a transmit weight vector that optimizes a signal-to-noise ratio for communication with the second communication device.
14. (original) The method of claim 11, and further comprising storing in the first communication device transmit antenna weights indexed against an identifier for the second communication device.
15. (currently amended) The method of claim 11 ~~1~~, wherein the step of applying is performed for each of K frequency sub-bands of the baseband signal that correspond to sub-carriers of a multi-carrier baseband signal or to synthesized frequency sub-bands of a single carrier baseband signal.
16. (original) The method of claim 15, and further comprising storing in the first communication device, for each of the N antennas, complex transmit antenna weights for a subset of the K frequency sub-bands or sub-carriers.
17. (original) The method of claim 15, and further comprising retrieving the stored subset of complex transmit antenna weights and generating therefrom the complete set of antenna weights for all of the K frequency sub-bands or sub-carriers using interpolation techniques.